

**CLAIMS**

1. Apparatus for reducing noise in an area, comprising a transducer disposed at a first location and arranged to transduce sound substantially in said area into a signal which is measurably by a measuring device, said measuring device being disposed at said first location or at a second location and coupled to a sound cancellation device, said sound cancellation device being configured to generate a cancellation signal of approximately an equal intensity and opposite polarity to said measurably signal and to transmit said cancellation signal to said area thereby substantially reducing the amount of noise audible in said area.
2. Apparatus as claimed in Claim 1, wherein said first location is in or proximate to said area.
3. Apparatus as claimed in any preceding Claim, wherein said second location area is remote from said area.
4. Apparatus as claimed in any preceding Claim, wherein said area is proximate to a human ear.
5. Apparatus as claimed in any preceding Claim, wherein said transducer is human skin.
6. Apparatus as claimed in Claim 5, wherein said human skin is a part of a human pinna.

7. Apparatus as claimed in any of Claims 5-6, wherein said transducer includes pressure sensitive paint.
8. Apparatus as claimed in any of Claims 1-4, wherein said transducer is a sensor.
9. Apparatus as claimed in Claim 8, wherein said sensor is arranged to generate a voltage in response to sound.
10. Apparatus as claimed in Claim 8, wherein said sensor is arranged to generate a magnetic field in response to sound.
11. Apparatus as claimed in any of Claims 1-8, wherein said measuring device is an optical device.
12. Apparatus as claimed in Claim 11, wherein said optical device is an interferometer.
13. Apparatus as claimed in Claim 12, wherein said interferometer comprises a laser as a light source.
14. Apparatus as claimed in Claim 9, wherein said measuring device is arranged to measure said voltage.

15. Apparatus as claimed in Claim 10, wherein said measuring device is arranged to measure said magnetic field.
16. Apparatus as claimed in any preceding claims, wherein said apparatus further comprising a tracking device arranged to search for said transducer, to acquire a location of said transducer, and to track said location of said transducer, said tracking device being further arranged to communicate said location of said transducer to said measuring device.
17. Apparatus as claimed in Claim 16, wherein said tracking device is disposed in a headrest.
18. Apparatus as claimed in any of Claims 16-17, wherein said tracking device is a video tracking device.
19. Apparatus as claimed in any preceding claim, wherein said apparatus further comprising a further measuring device disposed remote from said area and arranged to measure background noise proximate to said area, said background noise being communicated to said sound cancellation device to facilitate reducing the amount of noise audible in said area.
20. Apparatus as claimed in Claim 19, wherein said further measuring device is a microphone.

21. Apparatus as claimed in any preceding claim, wherein said apparatus further comprising a filter disposed between said measuring device and said cancellation device and arranged to pass a range of frequencies, thereby enabling said apparatus to cancel noise based on a frequency of said noise.
22. Apparatus as claimed in any preceding claim, wherein said area is in a vehicle.
23. A method for reducing noise in an area, the method comprising the steps of:  
transducing sound in said area into a signal,  
measuring said signal from a location remote from said area,  
generating a signal of approximately an equal intensity and opposite polarity to said measured signal, and  
transmitting said generated signal to said area, thereby substantially reducing the amount of noise audible in said area.
24. A method as claimed in Claim 23, comprising the further step of measuring background sound remote to said area, and using said measurement of background sound to facilitate the reducing the amount of noise audible in said area.
25. Apparatus for reducing noise as hereinbefore described with reference to the accompanying figures.

26. Apparatus for reducing noise in an area proximate an ear of an observer, comprising:

- a transducer arranged to transduce noise sound substantially in said area into a signal;
- a measuring device arranged to measure the signal from the transducer;
- a sound cancellation device configured:
  - to receive information from the measuring device;
  - to generate a cancellation sound of approximately an equal intensity and opposite polarity to said noise sound; and
  - to transmit said cancellation sound to said area thereby substantially reducing the amount of noise sound audible in said area by said observer,

characterised in that:

the transducer is mounted on the body of the observer,  
the measuring device is remote from the transducer, and  
the transducer wire-lessly transmits the signal, representing sound in the vicinity of the ear canal, to the measuring device.

27. Apparatus according to claim 26 wherein the wire-less transmission of the signal takes the form of light reflected from the transducer, and said measuring device is an optical device.

28. Apparatus as claimed in any of Claims 26-27, wherein said transducer includes pressure sensitive paint.

29. Apparatus according to Claim 28 wherein the transducer comprises a pressure sensitive paint applied to the skin of the observer.
30. Apparatus as claimed in any of Claims 26-27, wherein said transducer is human skin.
31. Apparatus according to Claim 29 or Claim 30 wherein the skin forms part of the ear of the observer.
32. Apparatus as claimed in Claim 31, wherein said skin is a part of a human pinna; concha; and/or cavum.
33. Apparatus as claimed in any of Claims 27-32, wherein said optical device is an interferometer.
34. Apparatus as claimed in Claim 33, wherein said interferometer comprises a laser as a light source.
35. Apparatus as claimed in Claim 26, wherein said transducer is a sensor.
36. Apparatus as claimed in Claim 35, wherein said sensor is arranged to generate a voltage in response to sound, and said measuring device is arranged to measure said voltage.
37. Apparatus as claimed in Claim 35, wherein said sensor is arranged to generate a magnetic field in response to sound, said wireless transmission is a

magnetic field, and said measuring device is arranged to measure said magnetic field.

38. Apparatus according to any of Claims 35-36 wherein the transducer comprises a sensor embedded in an item of jewellery for wearing on the ear of the observer.

39. An item of jewellery, for wearing on or proximate the ear, comprising a transducer for use in a system according to any of Claims 26-38.

40. Apparatus, or an item of jewellery according to claim 38 or claim 39, wherein the item of jewellery is in the form of an earring.

41. Apparatus as claimed in any of claims 26-38, or 40, wherein said apparatus further comprises a filter disposed between said measuring device and said cancellation device and arranged to pass a range of frequencies, thereby enabling said apparatus to cancel noise sound based on a frequency of said noise.

42. Apparatus as claimed in any of claims 26-38, 40 or 41, wherein said apparatus further comprising a tracking device arranged to search for said transducer, to acquire a location of said transducer, and to track said location of said transducer, said tracking device being further arranged to communicate said location of said transducer to said measuring device.

43. Apparatus as claimed in Claim 42, wherein said tracking device is disposed in a headrest.

44. Apparatus as claimed in any of Claims 42-43, wherein said tracking device is a video tracking device.

45. Apparatus as claimed in any of claims 25-38, 40-44, wherein said apparatus further comprises a further measuring device disposed remote from said area and arranged to measure background noise proximate to said area, said background noise being communicated to said sound cancellation device to facilitate reducing the amount of noise audible in said area.

46. Apparatus as claimed in Claim 45, wherein said further measuring device is a microphone.

47. A method for reducing noise in an area proximate an ear of an observer, the method comprising the steps of:

- transducing noise sound in said area into a signal,
- measuring said signal
- generating a sound of approximately an equal intensity and opposite polarity to said measured sound, and
- transmitting said generated sound to said area, thereby substantially reducing the amount of noise audible in said area, characterised in that the method further comprises:
  - using a transducer mounted on the body of the observer; and wire-lessly transmitting the signal from the transducer to a remote measuring device.



48. A method according to claim 47 wherein the wire-less transmission of the signal is achieved by the reflection of light from the transducer, for measurement in an optical device.

49. A method as claimed in any of Claims 47-48, wherein said reflection comprises reflection from pressure sensitive paint.

50. A method according to Claim 49 further comprising the step of applying the pressure sensitive paint to the skin of the observer, for use as the transducer.

51. A method as claimed in any of Claims 47-48, wherein human skin is used as the transducer.

52. A method according to Claim 50 or Claim 51 wherein the skin of the ear of the observer is used as the transducer.

53. A method as claimed in Claim 52, wherein the skin of a human pinna; concha; and/or cavum, is used as the transducer.

54. A method as claimed in any of Claims 47-53, wherein the light is measured in an interferometer.

55. A method as claimed in Claim 54, wherein a laser is used as a light source for emitting light for reflection by the transducer.

56. A method as claimed in Claim 47, wherein said transducer is a sensor.

57. A method as claimed in Claim 56, wherein said sensor generates a voltage in response to the sound, and a measuring device measures said voltage.

58. A method as claimed in Claim 56, wherein said sensor generates a magnetic field in response to the sound, the wireless transmission is performed by a magnetic field, and a measuring device measures said magnetic field.

59. A method according to any of Claims 56-58 wherein the transducer is embedded in an item of jewellery for wearing on the ear of the observer.

60. A method as claimed in any of Claims 47-59, further comprising filtering between a measuring device and said cancellation device to pass a range of frequencies, thereby enabling said apparatus to cancel noise sound based on a frequency of said noise.

61. Apparatus as claimed in any of claims 47-60, further comprising tracking by searching for said transducer, acquiring a location of said transducer, tracking said location of said transducer, and communicating said location of said transducer to said measuring device.

62. Apparatus as claimed in Claim 61, wherein said tracking is performed by a video tracking device.

63. A method as claimed in Claims 47-62, comprising the further step of measuring background sound remote to said area, and using said measurement of

background sound to facilitate the reducing the amount of noise audible in said area.

64. Apparatus for reducing noise as hereinbefore described with reference to the accompanying figures.